# HopeLab: Play That Works

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All right, what I'm gong to do is to begin by telling you a little bit about HopeLab, who we are, what we do. We are a 501c3 nonprofit that's about, I think, four or five years old right now that was conceived with the mission of basically combining rigorous research with innovative solutions to improve the health and quality of life of young people with chronic illnesses, a standard sort of mission statement. What we really do is we build social technology solutions to impact health and so what I'm going to be doing today is talking to you about our first fully developed product and some of the new initiatives that we have underway right now.

The general recipe we use is what we call rationally targeted social technology. We sort of tag line it as 'play that works.' We want our social technology solutions to 'read' in the eyes of users as fun stuff that is intrinsically appealing and we don't particularly want the fact that we're trying to engineer behavior to be at all something that's in the consciousness of our users or in really sort of the perception of the product itself, except for audiences that are actually trying to create similar kinds of intervention. So I'll be telling you about the guts of our design strategy today.

By social technology, we just mean broadly any kind of technology that has an interpersonal component to it and that comes down to most kinds of technology. Technology is just really a platform for getting people to talk to one another. They can be very different kinds of people, people with a conception of the world or health talking to people that have a different conception of that or it can be other kinds of more transparently social technologies, like social networking websites and we'll talk a little bit about each of those kinds of venues today.

So what I'll do most of the talk is describe our first fully tested product, the Remission video game for kids with cancer. This game basically reads like a standard interactive digital video game. The back story is simply - you're the pilot of a microscopic little robot, the nanobot Roxy there, you can see, flying around in the body of nineteen different fictional teenagers with cancer and your job is basically to blast cancer cells, kill bacteria, investigate mysterious symptomotology, and basically do all the kinds of things that doctors or the, you know, more broadly speaking, the entire medical care system does with kids with cancer, only from the inside of the body, and you'll see in a little while about why that kind of setting is really important for the kinds of behavioral objectives we have. So this all takes place in the bodies of cancer patients with seven of the most prevalent types of cancer in this age group. It's a 20-level video game, not an easy thing to build. It took about three to five years and a, you know, sort of an unthinkable amount of money, really, to put this thing together, but we were really trying to push the envelope for what this kind of technology can do in terms of behavior change. So this is the setup for the game, basically. The old school nanobot there that's holographically projected is teaching the new school nanobot, Roxy, basically how to get about in the body and get things done. (*Demonstrates game*) So, I'm not sure how well you can see this, but this is what the game play actually looks like. So you—this is called a third-person shooter game. You can see your little robot flying around in the body. She's blasting away at lymphoma cells in a lymph node. There's a situation map in the upper left hand corner that's actually cut off because of the sort of the quirks of the video set-up here, but basically, you know, it looks a lot like any other kind of commercial video game. She's going to fly through these lymph nodes, blast away these cells, and essentially clear this lymph node and then go off to another lymph node. There's

sort of a back story that you just saw for each of the mission levels and the—I'll talk a little bit in a couple of seconds about what's actually going on when people play the game, how this isn't just simply flying around blasting stuff, although that actually turns out to be a useful thing to do for certain of our objectives, but in fact, because of the way the game's built, it's sort of baked into the contingency structure of game play, mechanisms for teaching people things and motivating them to do things that they already know they should do, they just aren't that excited about doing. So these are kinds of instances of what we call more broadly rational engineering. So, when we built this game, we didn't just make a pretty video game that would be somehow fun or psychologically satisfying and then just hope that it would actually have an impact on behaviors that are important. We started from the very beginning with a strong sort of, if you will, mission-driven sense of what we wanted to accomplish by essentially reverse engineering physical health into its behavioral components and then addressing the psychological determinants of those behaviors. So for example, if we take cancer mortality in adolescents as our key biological endpoint, we then ask, okay, what kinds of behaviors influence that biological outcome?  Well, in the context of the literature that already exists on adolescent cancer patients, we know that they're not terrifically good at consistently adhering to prescribed medication regimens, particularly once their initial symptoms have abated, and sometimes they have two years of follow up chemotherapy they need to be taking. They're pretty good at that for the first month while they feel sick, but once the symptoms abate they sort of have this implicit sense that they're out of the woods and they don't need to worry so much about having cancer or being a cancer patient any more. There's are other kinds of things they're not great at like symptom reporting and other things like that. We have a roster of about 20 specific behavioral issues that impact on some level or another cancer mortality, according to the existing literature or according to pilot studies that we did as, essentially, a needs assessment. Having identified these behavioral targets, we then ask what kinds of psychological events cause maladaptive or non-optimal behaviors to occur or prevent, you know, the positive behaviors that we want to take place from occurring. These usually aren't that the patient is stupid. These are smart kids. They know what's going on. They know they have cancer on some level. They know that it could kill them. So if they are not behaving in ways that are consistent with optimal recovery from cancer, there's probably a pretty good reason. It's probably not capricious stuff. It has something to do, for example, in the context of medication adherence, with their beliefs about their current health state. Once the symptoms have abated, they sort of implicitly feel, I'm cured. They want to be done having cancer, so they don't want to really be thinking about cancer any more and so they don't want to be thinking about everything else associated with cancer like your chemotherapy. So they have, broadly speaking, a sort of cognitive set, an experience, based upon, you know, their sensory input that tells them essentially, they don't need—it's not quite so important to be taking your chemotherapy now for the next two years. Yeah, you pretty much need to take it, but you can skip a few doses here and there. So what we do in the game basically, is we capture that experiential field in the context of game play and then we allow players to live out the contingencies of their behavior and understand what's going on inside the game, essentially in terms of the biological impact of what's going on. So for example, we'll have them fly around in the body of a patient that has— that's supposedly in remission, just like they are, and find that, in fact, there are still a few cancer cells in there, they're replicating, and if you don't take your chemotherapy, then your chemotherapy blaster misfires every fifth or sixth shot or something like that. That's really the kind of contingency that the game play, you know, that players of video games don't like because they really want to have that satisfaction of killing stuff and so, essentially what we're doing is we're creating that relationship between the behavior of an individual at the whole body level and the biological

consequences that are happening inside the body but that aren't typically salient to an adolescent when they're four or five or six months out from their initial therapy.

So actually, in the interest of time, I'm going to skip some of these other details and tell you a little bit about what we do to actually convince ourselves that this kind of an intervention works. So what we did is basically carried out a randomized intervention trial of 374 young people with cancer recruited from 34 medical centers in the US, Canada, and Australia in which we gave each one of them a personal computer that contained either a control commercial video game or the same control commercial video game plus Remission, and we assessed a variety of psychological behavior on medical parameters at baseline right before we gave them the computers and then one and three months later, and I'm going to show you some of the key results from that trial. On the psychological side we saw, as we expected, a more rapid increase in cancer-related knowledge among kids who were randomized to the Remission group, and these are intent to treat analyses, so they include the people - about 15 percent or so - who didn't actually decide to play their assigned video game. We also saw increases in self efficacy, your subjective conception that you can do what it takes to beat cancer which is terribly important in enabling lots of behaviors that we want to enable. We also saw, when we looked at objective measure of treatment utilization, things like electronic pill cap monitors telling us that they're actually taking their antibiotics on schedule or blood levels of chemotherapy metabolites, that individuals randomized to the Remission condition essentially showed better adherence at the level of these technical verifications. So what that tells us basically is that this kind of digital game-based intervention can be effective. One of the things that's nice about it, of course, is that it's easily distributable. So we've pushed out more than 92,000 copies of this game to people in 77 countries across the Earth. Now, of course, not all of those—in fact, we think the majority of them aren't people with cancer, but we think that, you know, certainly our ability to penetrate the—about 5,000 person market in our target audience per year, in terms of adolescents and young adults with cancer, has been pretty effective. We've also tried to fuse this with other kinds of technological approaches for dealing with things like the social support crisis that happens when you're an adolescent with cancer because that marks you as different from essentially everybody else you know. It has a strange accelerating effect in your psychological maturation that leaves you out of sync with the rest of your peer group. So one thing we can do is we can try and distribute, for example, Remission through a website that also, incidentally, creates opportunities for building social networks with other people in a similar boat, and I think if we have time later I'll tell you about some of the other things that we're working on. We have an initiative underway right now, particularly, to generate ideas for products that we can build to essentially address the obesity epidemic, particularly at the level of physical activity. We think we're not that leverage for addressing food consumption, but we think the kind of things that we do probably are best targeted at changing physical activity levels and we also have on deck in our future activity the generalization of this basic technology development recipe to sickle cell disease, autism, and major depressive disorder. So that's basically what HopeLab is up to, building more games that work.

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